In this study organic Field-Effect-Transistors (oFETs) are used to investigate the transport properties of charge carriers in organic semiconductors. From the current-voltage characteristics material parameters such as the mobility μ_{FET} can be extracted. The extracted parameters have to be corrected for contact resistances, as these can dominate the overall behavior of an oFET. It is also important to get an improved understanding of the physical mechanisms at a metal/organic semiconductor contact for applications such as organic photovoltaics. In this study we use two different approaches to isolate the contact resistance of an oFET from the channel resistance. Firstly, the channel length of the oFET was varied for different devices; while the contact resistance remains constant, the channel resistance scales according to the channel length. Thus it is possible to extract the contact resistance. However, the deviations from device to device can complicate this analysis. Furthermore one cannot differentiate between the contact resistance at source and drain. These disadvantages can be overcome by the second approach: A gated four-probe structure was used to directly measure the voltage drop at the source and the drain in an operating transistor. The organic semiconductors used were poly(3-hexylthiophene) (P3HT) and [6,6]-phenyl-C61-butyric acid methyl ester (PCBM).

SYOE 8.23 Tue 18:00 Poster B

Initial growth of evaporated copper phthalocyanine thin-films - — •Biswas Indro[1], Peisert Heiko[1], Nagel Mathias[1], Casu Maria Benedetta[1], Schuppler Stefan[2], Nagel Peter[2], Pellegrin Eric[2,3], and Chassé Thomas[1] — [1]Institut für Physikalische und Theoretische Chemie, Universität Tübingen, Auf der Morgenstelle 8, 72076 Tübingen, Germany — [2]Forschungszentrum Karlsruhe, Institut für Festkörperphysik, P. O. Box 3640, 76021 Karlsruhe, Germany — [3]Consorcio para la Construcción, Equipamiento y Explotación del Laboratorio de Luz de Sincrotrón, P. O. Box 68, 08193 Bellaterra (Barcelona), Spain

The growth of copper phthalocyanine thin films evaporated on polycrystalline gold is examined in detail, using near-edge x-ray absorption fine structure (NEXAFS) spectroscopy and surface-sensitive x-ray photoemission spectroscopy (SXPS). Measurements were done at the Angstroemquelle Karlsruhe ANKA (WERA beamline). The molecular orientation of thin-films between 0.2 to 3 nm thickness was examined, focussing on the layers directly at the interface. By utilising the different surface sensitivities of both methods, it was possible to distinguish between the uppermost layer and the layer directly at the interface to gold. It was found that about three layers at the interface grow parallel to the substrate surface, whereas subsequent molecules are perpendicular oriented. Thus, the buried interfacial layer(s) in thin film systems can be differently oriented compared to the majority of molecules.

SYOE 8.24 Tue 18:00 Poster B

Conductivity of transparent Indium-Tin-Oxide-nanoparticle/polymer composite layers — •Norman Mechau[1], Anna Prodi-Schwab[2], and Roland Schmechel[1] — [1]Forschungszentrum Karlsruhe, Institut of Nanotechnology, 76021 Karlsruhe, Germany — [2]Degussa AG, Science to Business Center, 45764 Marl, Germany

The conductivity and optical absorption behavior of transparent composite layers consisting of conductive polymer poly(3,4-ethylenedioxythiophene)/poly(4-styrene sulfonate) (PEDT:PSS) mixed with high conductive Indium Tin Oxide (ITO) nanoparticles was investigated. Below the percolation threshold of the ITO nanoparticles, at a volume fraction of the ITO ˜ 0.16, the conductivity decreases with increase of the ITO content. The reason for this decrease is a compensation of charge carriers between the p-doped PEDT:PSS and the n-doped ITO. By applying a simple harmonic oscillator approximation, based on superposition of two phase system and a partial compensation of carriers the change in the optical characteristics can be explained. Furthermore, the reduction of the total numbers of charge carriers by compensation explains the decrease of conductivity.

SYOE 8.25 Tue 18:00 Poster B

Growth of sexithiophene (6T) films studied by reflectance difference spectroscopy — •L.D. Sun[1], S. Berkebile[2], G. Weidlinger[1], G. Koller[2], F.P. Netzer[2], M.G. Ramsey[2], M. Hohage[1], and P. Zeppenfeld[1] — [1]Institute of experimental physics, Johannes Kepler University Linz, Linz, Austria — [2]Institute of Physics, Karl-Franzens University Graz, Graz, Austria

As a linear differential optical method, reflectance difference spectroscopy (RDS) is extremely sensitive to any kind of optical transition which is polarization dependent, from single molecule excitation to excitons of molecular aggregates. Here, we report our in-situ RDS investigation of 6T film growth on anisotropic substrates, namely Cu(110)-(2x1)O and TiO2(110). The orientation of 6T molecule and the optical property of 6T thin film have been monitored over the entire range of the film thickness up to several nm. At submonolayer coverage, the optical property of the film is close to that of single molecule. However, already when the thickness of the film approach to one completed monolayer, exitonic state represented by Davydov splitting sets in. Following the evolution of RD spectrum, the growth mode and the film morphology can be deduced. For 6T grows on Cu(110)-(2x1)O , all molecules in the film are uniaxially aligned with their long molecular axes parallel to the CuO rows and to the Cu substrate surface. Similar growth mode has also been observed for 6T growth on TiO2(110) at liquid nitrogen temperature. However the 6T growth on TiO2(110) at room temperature shows a different behavior.

SYOE 8.26 Tue 18:00 Poster B

Para-sexiphenyl thin films grown on KCl(001) substrates — Andrei Andreev[1], Gerardo Sosa[2], Thomas Haber[3], Andrey Kadashchuk[4], •Gregor Hlawacek[1], Roland Resel[3], Helmut Sitter[2], Serdar Sariciftci[5], and Christian Teichert[1] — [1]Inst. of Physics, University of Leoben, Austria — [2]Inst. of Semiconductor and Solid State Physics, University Linz, Austria — [3]Inst. of Solid State Physics, Graz University of Technology, Austria — [4]Inst. of Physics, Natl. Acad. of Sci. of Ukraine, Kiev, Ukraine — [5]Inst. f. Organic Solar Cells (LIOS), University Linz, Austria

Para-sexiphenyl (6P) films grown on KCl(001) substrates are promising for optoelectronic devices. In this work we use Atomic Force Microscopy (AFM), x-Ray diffraction (XRD) and photoluminescence (PL) in order to find the parameters controlling film morphology, structure and quality. It is shown that the initial growth stage is characterized by the formation of long needles, generating a rectangular network in accordance with the substrate surface symmetry. With increasing coverage, terraced mounds composed of upright standing molecules developing between the needles. Both features are single crystalline as shown by XRD and TEM. PL studies have shown that the emission spectra contain two different components - a structured spectrum due to intrinsic excitons and a broad red-shifted band ascribed to some kind of defects. It was shown that the relative intensity of the defect band is much weaker in the films grown on KCl comparing to that on mica. This finding confirms the high quality of the films and supports an idea of structural origin of these defects.

SYOE 8.27 Tue 18:00 Poster B

structural and electrical properties of poly(3-octylthiophene) films: a scanning probe microscopy study — jose abad[1], beatriz perez-garcia[1], elisa palacios-lidon[1], antonio urbina[2], and •jaime colchero[1] — [1]cioyn, departamento de fisica, universidad de murcia, murcia, spain — [2]departamento de electronica, universidad politecnica de cartagena, cartagena, spain

Poly-(3-octylthiophene) (P3OT) is one of the most promising materials for applications in organic solar cells. In the present work we find that P3OT thin films (50-500nm) present a very rich nanostructure which is studied by scanning force microscopy techniques. From a morphological point of view, self- assembled lamellar structures are formed on the surface of the films, theirs morphologies are very rich depending on the polymer films growth conditions (drop casting or spin coating).

Kelvin force microscopy (KFM) is applied to study the electrical properties of the films under different working conditions, in particular under light illumination and while an electrical current is passing through the thin film. We find that, on the lamellar structures, different surface potential domains are visualized by KFM.

SYOE 8.28 Tue 18:00 Poster B

A flexible approach to the fabrication of chemical gradients using functional monomolecular films — •Nirmalya Ballav[1], Andrey Shaporenko[1], Andreas Terfort[2], and Michael Zharnikov[1] — [1]Angewandte Physikalische Chemie, Universität Heidelberg, 69120 Heidelberg, Germany — [2]Anorganische und Angewandte Chemie, Universität Hamburg, 20146 Hamburg, Germany

We present a new approach for the fabrication of chemical gradients on different substrates. The key idea of the method is tuning the exchange-reaction between a self-assembled monolayer covering the substrate and a potential molecular substituent by electron irradiation. As test systems, we used alkanethiolate monolayers on gold, which are well-known to undergo an exchange-reaction with molecules